

CLAIMS

1. A method of altering a property of a cell towards a property of one or more desired cell types comprising providing isolated RNA comprising a RNA sequence extractable from cells comprising said desired cell type(s) to a population of cells under conditions whereby the alteration of the cell property is achieved.
2. A method according to claim 1, wherein said isolated RNA is provided to a cell population in a patient.
3. A method according to claim 1 or claim 2, wherein said property is phenotypic.
4. A method according to any one of the preceding claims, wherein said property is a cell function.
5. A method according to any one of the preceding claims, wherein alteration of said property involves a genetic transformation so that said population of cells acquires an altered, inherited genotype.
6. A method according to any one of the preceding claims, wherein the alteration of the cell property is the differentiation of a stem cell to an adult specialised cell.
7. A method according to any one of the preceding claims, wherein the alteration of the cell property is the reverse differentiation of an adult specialised cell to a stem cell.
8. A method according to any one of the preceding claims, wherein the alteration of the cell property is the differentiation of a specialised adult cell to an adult cell of a different specialty.
9. A method according to any one of the preceding claims, wherein the alteration of the cell property is a change in immunological profile.
10. A method according to any one of the preceding claims, wherein said method improves stem cell-mediated repair in a patient.
11. A method according to any one of the preceding claims, wherein said method induces stem cell mobilisation, migration, integration, proliferation and/or differentiation in a patient.
12. A method according to any one of the preceding claims, wherein said method effects repair of diseased cells, alters the genetic constitution of cells, induces specific cell types and/or cell fates, changes the immunological profiles of cells, and/or induces particular desired immune functions or properties.
13. A method according to any one of the preceding claims, which additionally comprises the step of providing stem cells to the patient.

14. A method according to any one of the preceding claims, wherein said step of providing stem cells is sequential to, simultaneous with, or separate to said step of providing the isolated RNA.
- 5 15. A method according to any one of the preceding claims, wherein the isolated RNA comprises a RNA sequence that is extractable from cells of a different developmental stage than the developmental stage of the cells to be treated.
16. A method according to any one of the preceding claims, wherein the isolated RNA comprises a RNA sequence that is extractable from cells of a more active cell generative stage than that of the cells to be treated.
- 10 17. A method according to any one of the preceding claims, wherein the isolated RNA comprises a RNA sequence that is extractable from cells from an individual who shows immunity or resistance to a disease or condition.
18. A method according to any one of the preceding claims, wherein the isolated RNA comprises a RNA sequence extractable from foetal cells, neonatal cells, juvenile cells or embryonic stem cells.
- 15 19. A method of inducing *in vivo* or *in vitro* totipotent or pluripotent stem cells of a stem cell line or derived from a tissue of an animal or plant to differentiate into one or more desired cell types, which comprises providing isolated RNA comprising RNA extractable from tissue or cells comprising said desired cell type(s) to a cell culture of said stem cells under conditions whereby the desired differentiation of said stem cells is achieved.
- 20 20. A method of inducing *in vivo* or *in vitro* totipotent or pluripotent stem cells of a stem cell line or derived from a tissue of an animal or plant to mobilise, migrate, integrate, proliferate and/or differentiate, which comprises providing isolated RNA comprising RNA extractable from tissue or cells comprising said desired cell type(s) to a cell culture of said stem cells under conditions whereby the desired differentiation of said stem cells is achieved.
- 25 21. A method as claimed in any one of the preceding claims wherein said cells are stem cells.
22. A method according to claim 20, wherein said stem cells are adult animal stem cells or an adult stem cell line.
23. A method as claimed in claim 20 or claim 21 wherein said stem cells are embryonic stem cells or a stem cell line derived from such cells.
- 30 24. A method as claimed in claim 21 wherein said adult stem cells are bone marrow stromal cells, haematopoietic stem cells or neuronal stem cells or a corresponding derived stem cell line.

25. A method as claimed in any one of the preceding claims wherein said cells are human stem cells or a human stem cell line.
26. A method as claimed in any one of the preceding claims wherein said cells are caused to differentiate into one or more stable terminal cell types.
- 5 27. A method as claimed in any one of the preceding claims wherein the cells are genetically modified prior to differentiation.
28. A method as claimed in any one of the preceding claims wherein the cells are derived from the intended recipient of said desired cells.
- 10 29. A method as claimed in any one of the preceding claims wherein said RNA comprises RNA extracted from tissue or cells of an individual different from the source of the cells to be treated, said extracted RNA being derived from a donor having an immunological profile compatible with the intended recipient of the desired cells.
30. A method according to any one of the preceding claims wherein a RNA extract is provided for uptake by the cells which is a whole tissue or whole cell RNA extract.
- 15 31. A method as claimed in any one of the preceding claims wherein RNA-extractable from one or more types of brain cell or brain cell line is provided for uptake by cells.
32. A method as claimed in any one of the preceding claims wherein the cells are bone marrow stromal stem cells and the isolated RNA provided comprises RNA extractable from one or more types of brain cell or skeletal muscle or a corresponding derived cell line of either.
- 20 33. Use of a RNA capable of inducing differentiation of stem cells in accordance with any one of claims 1 to 31 in the manufacture of a medicament for use in improving or rectifying tissue or cellular damage or a genetic disease.
34. A use according to claim 32 wherein said RNA is suitable for inducing *in vivo* differentiation of totipotent or pluripotent stem cells for treatment of a degenerative brain disease or brain or spinal cord injury.
- 25 35. A use according to claim 32 or claim 33 wherein said RNA is suitable for inducing *in vivo* differentiation of totipotent or pluripotent stem cells for treatment of a disease selected from liver disease, heart disease, skeletal or cardiac muscle disease or type I diabetes.
36. A use according to claim 32 or claim 33 wherein differentiation of stem cells is induced *in vivo* to counteract age-related degenerative disease.
- 30 37. A method of reversing *in vitro* the differentiation of differentiated cells of a cell line or obtained from the tissue of an animal or a plant to produce a desired type or types of

totipotent or pluripotent stem cell(s) or stem cell line(s), which comprises providing isolated RNA comprising RNA extractable from the desired type(s) of stem cell or stem cell line to a cell culture of said differentiated cells whereby the desired reversal of differentiation of the differentiated cells into said type(s) of stem cell or stem cell line type(s) is achieved.

- 5 38. A method according to claim 36, wherein the cell is as defined in any one of claims 20 to 24.
39. A method according to claim 36 or 37, wherein the differentiated cells are selected from skin cells, bone marrow cells and haematopoietic cells or a cell line derived from such cells.
40. A method according to claim 36 or 37, wherein the differentiated cells are fibroblasts or a fibroblast cell line and the RNA is extractable from bone marrow stem cells or neuronal stem cells.
- 10 41. A method according to claim 39, wherein the isolated RNA provided comprises RNA extractable from bone marrow stromal stem cells, neuronal stem cells or a stem cell line derived from either.
42. An *in vitro* method of producing differentiated cells, which comprises:
- 15 i) performing a method according to any one of claims 36 to 40 to produce stem cells or a stem cell line from differentiated cells;
- ii) performing a method according to any one of claims 1 to 31 on the stem cells or stem cell line to produce differentiated cells.
43. A method according to claim 41, further comprising introducing a genetic modification into the stem cells.
- 20 44. Cells obtained by a method according to any one of claims 1 to 31, or 36 to 42.
45. Use of cells according to claim 43 in the manufacture of a medicament for use in improving or rectifying tissue or cellular damage or a genetic disease.
46. A method of screening for a RNA sequence capable of conferring a desired property from one cell type to another, the method comprising the steps of
- 25 a) extracting RNA from cells comprising a desired cell type;
- b) separating the extracted RNA into different fractions;
- c) providing a fraction to a test cell;
- d) analysing the test cells for an altered property possessed by the desired cell type from which the RNA was extracted;
- 30 wherein a fraction that confers the altered property onto the test cell is identified as comprising a RNA sequence capable of conferring the desired property.